

Amendments to the Claims

The listing of claims will replace all prior versions, and listings of claims in the application.

1-2. (canceled)

3. (withdrawn) The package of claim 38, wherein an outer profile of said heat spreader overlaps with an inner profile of said ring shaped stiffener.

4. (withdrawn) The package of claim 38, wherein said second surface of said heat spreader is plated with solder that allows said second surface of said heat spreader to be surface mounted to soldering pads on the PCB.

5. (canceled)

6. (withdrawn) A ball grid array (BGA) package, comprising:
 a substrate having a plurality of contact pads on a first surface electrically connected through said substrate to a plurality of solder ball pads on a second surface of said substrate, wherein said substrate has a window opening that is open at said first surface and said second surface of said substrate;

 a heat spreader that has a first surface and a second surface, wherein said first surface of said heat spreader is attached to said second surface of said substrate;

 a ring shaped stiffener being centrally open in a first surface and a second surface, wherein said first surface of said ring shaped stiffener is attached to said first surface of said substrate;

an integrated circuit (IC) die that is mounted to said first surface of said heat spreader and is accessible through said window opening, wherein said die has opposing first and second surfaces, said first surface of said IC die including at least one contact pad, said second surface of said IC die being mounted to said first surface of said heat spreader; and

a wire bond that couples a contact pad of said first surface of said IC die to said first surface of said heat spreader;

wherein said second surface of said heat spreader is capable of being coupled to a printed circuit board (PCB).

7. (withdrawn) The package of claim 6, further comprising:

a wire bond that couples said contact pad of said first surface of said IC die to a corresponding metal trace on said first surface of said substrate.

8. (canceled)

9. (withdrawn) The package of claim 6, wherein said second surface of said heat spreader is coupled to a ground potential of the PCB.

10. (withdrawn) The package of claim 38, wherein said substrate is a tape substrate.

11. (canceled)

12. (withdrawn) The package of claim 38, wherein said IC die has a surface that includes a contact pad, wherein said package further comprises:

a wire bond that couples said contact pad to a corresponding metal trace on said first surface of said substrate.

13. (currently amended) A ball grid array (BGA) package, comprising:
a substrate having a plurality of contact pads on a first surface electrically connected through said substrate to a plurality of solder ball pads on a second surface of said substrate;
an integrated circuit (IC) die that is mounted to said first surface of said substrate;

a heat spreader that has a first surface and a second surface, wherein said first surface of said heat spreader is attached to said second surface of said substrate by an adhesive between said heat spreader and said substrate; and

a ring shaped stiffener being centrally open in a first surface and a second surface, wherein said first surface of said ring shaped stiffener is attached to said first surface of said substrate;

wherein said second surface of said heat spreader is capable of being coupled to a printed circuit board (PCB);

wherein said IC die is mounted to said first surface of said substrate in a flip chip configuration, wherein a conductive bump on an active surface of said IC die is connected to a conductive pad on said first surface of said substrate.

14-15. (canceled)

16. (previously presented) The package of claim 13, further comprising:
a second heat spreader attached to a non-active surface of said IC die and
said second surface of said ring shaped stiffener.

17. (previously presented) The package of claim 13, further comprising a via
located proximate to said mounted IC die that extends through said substrate from said
first surface of said substrate to said second surface of said substrate, wherein said via is
filled with a conductive material to couple said conductive bump to said heat spreader.

18. (withdrawn) A method of assembling a ball grid array (BGA) package,
comprising the steps of:

receiving a substrate having a plurality of contact pads on a first surface
electrically connected through the substrate to a plurality of solder ball pads on a second
surface of the substrate;

attaching a first surface of a heat spreader to the second substrate surface;
attaching a ring shaped stiffener that is centrally open in a first surface
and a second surface to the first surface of the substrate;

configuring a second surface of the heat spreader to be coupled to a
printed circuit board (PCB); and

attaching a plurality of solder balls to the second substrate surface.

19. (canceled)

20. (withdrawn) The method of claim 18, wherein said heat spreader attaching step comprises the step of:

attaching a first surface of the heat spreader to the second substrate surface, wherein an outer profile of the heat spreader overlaps with an inner profile of the ring shaped stiffener.

21. (withdrawn) The method of claim 18, further comprising the step of:

enabling the second heat spreader surface to be surface mounted to soldering pads on the PCB.

22. (withdrawn) The method of claim 21, wherein said enabling step comprises the step of:

plating the second heat spreader surface with at least one metal, wherein the at least one metal includes at least one layer of at least one of solder, nickel, and gold.

23. (withdrawn) The method of claim 18, further comprising the step of:

forming a window opening in the substrate.

24. (withdrawn) The method of claim 23, further comprising the step of:

mounting an integrated circuit (IC) die to the first heat spreader surface, wherein the IC die is accessible through the window opening.

25. (withdrawn) The method of claim 24, wherein the IC die has a surface that includes a contact pad, the method further comprising the step of:

coupling a wire bond between the contact pad and a metal trace on the first substrate surface.

26. (withdrawn) The method of claim 24, wherein the IC die has a surface that includes a ground contact pad, the method further comprising the step of:
coupling a ground wire bond between the ground contact pad and the first heat spreader surface.

27. (withdrawn) The method of claim 26, further comprising the step of:
coupling the second heat spreader surface to a ground potential of the PCB.

28. (withdrawn) The method of claim 18, wherein said receiving step comprises the step of:
receiving a tape substrate.

29. (withdrawn) The method of claim 18, further comprising the step of:
mounting an integrated circuit (IC) die to the first substrate surface.

30. (withdrawn) The method of claim 29, wherein the IC die has a surface that includes a contact pad, the method further comprising the step of:
coupling a wire bond between the contact pad and a metal trace on the first substrate surface.

31. (withdrawn) The method of claim 29, wherein said mounting step comprises the step of:

mounting the IC die to the first substrate surface in a flip chip configuration.

32. (withdrawn) The method of claim 31, further comprising the step of:
connecting a conductive bump on an active surface of the IC die to a conductive pad on the first substrate surface.

33-34. (canceled)

35. (withdrawn) The method of claim 18, further comprising the step of:
attaching a second heat spreader to a non-active surface of the IC die and a second surface of the ring shaped stiffener.

36. (withdrawn) The method of claim 32, further comprising the step of:
coupling the conductive bump to the heat spreader through a via that extends through the substrate.

37. (withdrawn) The method of claim 36, wherein said coupling step comprises the step of:
filling the via with a conductive material.

38. (withdrawn) A ball grid array (BGA) package, comprising:

a substrate having a plurality of contact pads on a first surface electrically connected through said substrate to a plurality of solder ball pads on a second surface of said substrate;

an integrated circuit (IC) die having opposing first and second surfaces, said first surface of said IC die including at least one contact pad, said second surface of said IC die being mounted to said first surface of said substrate;

a heat spreader that has a first surface and a second surface, wherein said first surface of said heat spreader is attached to said second surface of said substrate; and

a ring shaped stiffener being centrally open in a first surface and a second surface, wherein said first surface of said ring shaped stiffener is attached to said first surface of said substrate;

wherein said second surface of said heat spreader is capable of being coupled to a printed circuit board (PCB).

39. (withdrawn) The package of claim 38, wherein said heat spreader comprises at least one metal.

40. (withdrawn) The package of claim 39, wherein said at least one metal includes copper.

41. (withdrawn) The package of claim 39, wherein said at least one metal includes aluminum.

42. (withdrawn) The package of claim 38, wherein said heat spreader is substantially planar.

43. (withdrawn) The package of claim 38, further comprising:
a thermally conductive adhesive that attaches said first surface of said heat spreader to said second surface of said substrate.

44. (withdrawn) The package of claim 38, further comprising:
a thermally conductive adhesive that attaches said first surface of said ring shaped stiffener to said first surface of said substrate.

45. (withdrawn) The package of claim 38, wherein said ring shaped stiffener comprises at least one metal.

46. (withdrawn) The package of claim 45, wherein said at least one metal includes copper.

47. (withdrawn) The package of claim 45, wherein said at least one metal includes aluminum.

48. (withdrawn) The package of claim 38, further comprising:
a plurality of solder balls attached to said plurality of solder ball pads.

49. (withdrawn) The package of claim 38, wherein an outer surface of said ring shaped stiffener is flush with an outer edge of said substrate.

50. (withdrawn) The package of claim 6, further comprising:
an encapsulating material that fills a cavity formed by said ring shaped stiffener, said window opening, and said first surface of said heat spreader to encapsulate said IC die.

51. (withdrawn) The package of claim 38, further comprising:
an encapsulating material that fills a cavity formed by said ring shaped stiffener and said first surface of said substrate to encapsulate said IC die.

52. (previously presented) The package of claim 16, wherein said second heat spreader is attached to said second surface of said ring shaped stiffener with a thermally conductive adhesive material.

53. (previously presented) The package of claim 16, wherein said second heat spreader is attached to said non-active surface of said IC die with a thermally conductive adhesive material.

54. (previously presented) The package of claim 16, wherein said second heat spreader comprises at least one metal.

55. (previously presented) The package of claim 54, wherein said at least one metal includes copper.

56. (previously presented) The package of claim 54, wherein said at least one metal includes aluminum.

57. (previously presented) The package of claim 16, wherein said second heat spreader is substantially planar.

58. (previously presented) The package of claim 17, wherein said conductive material filling said via thermally couples said conductive bump to said heat spreader.

59. (previously presented) The package of claim 17, wherein said conductive material filling said via electrically couples said conductive bump to said heat spreader.

60. (withdrawn) A ball grid array (BGA) package, comprising:
a substrate having a plurality of contact pads on a first surface electrically connected through said substrate to a plurality of solder ball pads on a second surface of said substrate, wherein said substrate includes a window opening that is open at said first surface and said second surface of said substrate;

a heat spreader that has a first surface and a second surface, wherein said first surface of said heat spreader surface is attached to said second surface of said substrate;

an integrated circuit (IC) die having opposing first and second surfaces, said first surface of said IC die including at least one contact pad, said second surface of said IC die being mounted to said first surface of said heat spreader that is accessible through said window opening; and

a wire bond that couples a contact pad of said first surface of said IC die to said first surface of said heat spreader;

wherein said second surface of said heat spreader is capable of being coupled to a printed circuit board (PCB).

61. (withdrawn) The package of claim 60, wherein said heat spreader comprises at least one metal.

62. (withdrawn) The package of claim 61, wherein said at least one metal includes copper.

63. (withdrawn) The package of claim 61, wherein said at least one metal includes aluminum.

64. (withdrawn) The package of claim 60, wherein said heat spreader is substantially planar.

65. (withdrawn) The package of claim 60, further comprising:
a thermally conductive adhesive that attaches said first surface of said heat spreader to said second surface of said substrate.

66. (canceled)

67. (withdrawn) The package of claim 60, further comprising:
a plurality of solder balls attached to said plurality of solder ball pads.

68. (withdrawn) The package of claim 60, wherein said substrate is a tape
substrate.

69. (previously presented) The package of claim 13, wherein an outer profile
of said heat spreader overlaps with an inner profile of said ring shaped stiffener.

70. (previously presented) The package of claim 13, wherein said second
surface of said heat spreader is plated with solder that allows said second surface of said
heat spreader to be surface mounted to soldering pads on the PCB.

71. (new) A ball grid array (BGA) package, comprising:
a substrate having a plurality of contact pads on a first surface electrically
connected through said substrate to a plurality of solder ball pads on a second surface of
said substrate;
an integrated circuit (IC) die that is mounted to said first surface of said
substrate;
a heat spreader that has a first surface and a second surface, wherein said
first surface of said heat spreader is attached to said second surface of said substrate; and

a ring shaped stiffener being centrally open in a first surface and a second surface, wherein said first surface of said ring shaped stiffener is attached to said first surface of said substrate;

wherein said second surface of said heat spreader is capable of being coupled to a printed circuit board (PCB);

wherein said IC die is mounted to said first surface of said substrate in a flip chip configuration, wherein a conductive bump on an active surface of said IC die is connected to a conductive pad on said first surface of said substrate; and

wherein said second surface of said heat spreader is plated with solder that allows said second surface of said heat spreader to be surface mounted to soldering pads on the PCB.